

Bossier Parish Community College
Master Syllabus

Course Prefix and Number: MICR 206/206L

Credit Hours: 4

Course Title: Principles of Microbiology

Course Prerequisites: CHEM 101 or 107 and one life science course (BLGY or MICR)

Textbooks: Talaro, K. P.; Foundations in Microbiology, 7th edition
Leboffe, M.J. and Pierce, B.E.; A Photographic Atlas for the Microbiology Laboratory, 3rd edition

Course Description:

Medically important microbes, techniques used in their handling and control, infection control practices, and immunology are emphasized. Lecture and laboratory studies include microbial morphology, physiology, genetics, and identification. This course is designed for baccalaureate students, including nursing and science majors.

Learning Outcomes:

At the end of this course, the student will

- A. correlate the discovery of unifying concepts of microbiology that undergird current microbial discoveries with significant historical events;
- B. apply concepts of transmission, control, and treatment of infectious diseases to the clinical setting;
- C. relate virulence factors of microbes to man's immune function and the development of disease;
- D. demonstrate aseptic techniques when handling microbial cultures; and
- E. utilize basic microbiological laboratory equipment and methods correctly to generate and analyze laboratory-generated data.

To achieve these outcomes, the student will

- 1. explain the diversity of the microbial world, the history of its discovery, and methods used to examine its constituents. (A)
- 2. define what types of organisms constitute the microbial world. (A)
- 3. identify contributions to microbiology made by some early and current investigators. (A)
- 4. compare spontaneous generation and biogenesis. (A)
- 5. describe Koch's postulates and the germ theory of disease. (A,C)
- 6. compare classification schemes. (A)
- 7. give the basic structure and function of macromolecules of life. (A,B)
- 8. compare various types of light and electron microscopes. (A)
- 9. describe techniques for inoculation, isolation, inspection, and identification of

- microbes. (C)
10. give examples of various types of microbial media. (A)
 11. describe methods to obtain a pure culture of bacteria. (A,C)
 12. compare and contrast prokaryotic and eukaryotic cells. (A)
 13. give the importance of various staining techniques used in microbiology. (A,C)
 14. list cellular structures of prokaryotic and eukaryotic cells and give their functions. (A)
 15. give characteristics of fungi, algae, protozoans, and helminthes. (A,B,C)
 16. describe and compare medically important fungi, protozoans, viruses, and bacteria. (A,B,C)
 17. identify and characterize the most important systemic and superficial fungal pathogens of man. (B,C)
 18. identify and characterize the most important protozoan and helminth parasites of man. (B,C)
 19. differentiate viruses from other microbes. (A)
 20. summarize viral culture and viral detection. (B,C)
 21. explain steps in animal and bacterial virus replication. (B,C)
 22. identify and characterize many of the viral diseases of man. (B,C)
 23. discuss nutrients and environmental requirements for microbial growth. (A)
 24. diagram a bacterial growth curve and tell what occurs in each phase. (A)
 25. give characteristics of enzymes. (A)
 26. detail and compare glycolysis, Krebs's cycle, and fermentation pathways. (A)
 27. describe characteristics of DNA and how it carries the factors of heredity. (A)
 28. detail protein synthesis. (A)
 29. discuss DNA replication. (A)
 30. relate microbial genetics, metabolism, and biological molecules. (A)
 31. list causes of mutations. (A)
 32. describe genetic transfer among bacteria. (A,B,C)
 33. discuss ways to control microbial growth. (C)
 34. compare Kirby-Bauer and MIC sensitivity tests. (A,C)
 35. compare first, second, and third lines of defense. (A,B)
 36. list characteristics of all antibodies. (A,B)
 37. illustrate the role of the major types of T and B cells in immunity. (A,B)
 38. compile functions of leukocytes and antibodies. (A,B)
 39. differentiate humoral and cell mediated immunity. (A,B)
 40. compare the four types of hypersensitivity reactions. (A,B)
 41. define immunodeficiencies and autoimmune diseases. (A,B)
 42. list modes of transmission of infectious agents. (A,B,C)
 43. define nosocomial infection. (B,C)
 44. specify virulence factors of microbes. (A,B,C)
 45. identify a minimum of 30 pathogenic bacteria with the disease(s) it causes. (C)
 46. describe infection and disease caused by *Mycobacterium tuberculosis*. (C)
 47. use aseptic techniques needed to handle microorganisms. (A,B,C)
 48. use appropriate hand-washing techniques. (B,C)
 49. use the microscope. (C,D)
 50. identify representative protozoans, fungi, cyanobacteria, true bacteria, and algae. (D)

51. perform basic bacteriological transfer procedures. (E)
52. handle bacterial cultures aseptically in the preparation of bacterial smears. (B)
53. gram stain student-prepared smears and examine them using the oil immersion objective. (D)
54. recognize bacterial capsules and flagella. (C)
55. identify types of bacterial flagellation. (D)
56. perform and recognize an endospore stain. (D)
57. distinguish among true motility, water current movement, and Brownian movement. (D)
58. perform both streak plate, pour plate, and spread plate techniques. (D)
59. recognize the difference between a pure culture and an isolated colony. (D)
60. distinguish plates, slants, and broth as routinely used forms of culture media. (C,D)
61. analyze the effects of hypertonic salt conditions on various bacteria. (D)
62. apply basic mathematics and graphing to make dilutions and calculate numbers of microbes. (D)
63. use reading and writing skills to complete homework and essay assignments. (D)
64. use dilution concepts to perform a virus plaque assay. (D)
65. identify bacteria in pure culture using colony morphology, cell morphology, stains, and biochemical test results. (A,B)
66. compare the advantages and disadvantages of the API multitest system. (D)
67. perform tests to identify various staphylococci and streptococci. (D)
68. use a dichotomous flow chart to identify enteric and urinary tract pathogens. (D)
69. identify the five major classes of leukocytes from prepared slides. (D)
70. perform and/or demonstrate selected serological tests. (D)
71. summarize basic methods used to manipulate DNA. (D)
72. employ critical thinking skills to analyze microbial case studies. (B)

Course Requirements

- minimum average of 60% on lecture and laboratory tests
- minimum average of 70% on homework
- demonstrate the ability to isolate bacteria from a mixed culture
- satisfactorily perform a minimum of 25 assigned microbiology laboratory procedures

Course Grading Scale:

- A- 90% or more of total possible points with a minimum average of 60% on tests (laboratory and lecture) and a minimum of 70% on homework and demonstrated ability to isolate bacteria from a mixed culture and satisfactory completion of a minimum of 25 assigned microbiology laboratory procedures
- B- 80% or more of total possible points with a minimum average of 60% on tests (laboratory and lecture) and a minimum of 70% on homework and demonstrated

- ability to isolate bacteria from a mixed culture and satisfactory completion of a minimum of 25 assigned microbiology laboratory procedures
- C- 70% or more of total possible points with a minimum average of 60% on tests (laboratory and lecture) and a minimum of 70% on homework and demonstrated ability to isolate bacteria from a mixed culture and satisfactory completion of a minimum of 25 assigned microbiology laboratory procedures
 - D- 60% or more of total possible points with a minimum average of 60% on tests (laboratory and lecture) and a minimum of 70% on homework and demonstrated ability to isolate bacteria from a mixed culture and satisfactory completion of a minimum of 25 assigned microbiology laboratory procedures
 - F- less than 60% of total possible points or less than a minimum average of 60% on tests (laboratory and lecture) or less than 70% on homework or failure to demonstrate the ability to isolate bacteria from a mixed culture or failure to satisfactorily complete a minimum of 25 assigned microbiology laboratory procedures

Reviewed by E. Cox /May 2009